

## **On different collective storage schemes in energy communities with internal market**

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### **Abstract-**

Energy communities are recognised as a valuable framework to promote penetration of renewable sources at the residential level, as well as increment the efficiency and self-sufficiency of domestic users. In such paradigms, energy storage may bring notable benefits due to its energy arbitrage and capacity to efficiently manage renewable sources. However, at the residential level, storage systems are not widely deployed and, in this regard, collective storage options may suppose an attractive alternative. From a market perspective, energy communities can be cooperative or competitive. This paper focuses on the second case when internal community markets are launched to promote competition among prosumers. In such a framework, two possible collective storage schemes are analysed. On the one hand, the so-called competitive storage paradigm, in which storage assets partake in internal markets as an independent agent. On the other hand, the so-called cooperative storage scheme, by which storage assets are centrally managed to pursue collective welfare. To this end, the day-ahead scheduling tool for the community is extended to include both collective storage arrangements, thus resulting in different complementarity models that can be efficiently solved using off-the-shelf solvers. Such complementarity models are applied to a benchmark three-prosumers community, extracting various relevant results and conclusions. Generally, it is concluded that the cooperative storage scheme is more attractive for prosumers, allowing them to reduce their bill notably. However, this scheme seems very sensitive to the storage and community size and can discourage installing high-power&nbsp;

**Index Terms-** Complementarity models; Energy community; Energy storage; Sustainability

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